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# Impact of open access on CSIR-National Institute of Science Communication and Information Resources (NISCAIR) journals

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On the first International Open Access Day on 14th October 2008, CSIR-NISCAIR made two of journals available in the open access domain and today all 18 CSIR-NISCAIR journals are open access journals. This study aims to explore the impact of open access on CSIR-NISCAIR journals in terms of visibility, use, citations received and impact factor. The results point out that switching to open access has benefited the journals.

**Keywords:** open access; CSIR-NISCAIR journals; citations; impact factor

## Introduction

Globally, owing to the increasing cost of research journals, R & D organisations are finding it difficult to subscribe to this important information resource. The open access movement, among other things, has been focussing on enabling barrier-free access to research information. The emergence of open access journals, subject and institutional repositories has focussed on making available research information in the open access domain. Today, more and more researchers are joining the OA route by either publishing in open access journals or uploading their preprints in institutional repositories. Further, academic and research institutions are now mandating open access to research papers published by their researchers and scientists.

The Budapest Open Access Initiative (BOAI) defines open access as the right of users to "read, download, copy, distribute, print, search, or link to the full texts of the articles" as mandatory for a journal[1]. Open access (OA) journal publishing is emerging rapidly as an alternative to traditional subscription journal publishing.

Directory of Open Access Journals (DOAJ) was launched in 2003 with 300 journals and now it lists more than 10,000 journals. According to Forbes India[2], by 2011, 11% of research papers published worldwide were in fully OA journals and this rate is growing in double digit.

Open access is high on the political agenda in many countries worldwide. In 2013, USA and UK had taken important decisions with the Obama administration[3] stating that all public funded research in US would have to be made freely available within 12 months of their publication; and Research Council UK (RCUK)[4] has also made public funded research open to all.

In India, Department of Science and Technology (DST) and Department of Biotechnology (DBT) have prepared an"Open Access Policy (OAP)" according to which, "all the information and knowledge generated through the use of DST and DBT funded projects will be made publicly available, subject to Indian law and IP policies of respective funding agencies and institutions where the research is performed".[5]

Several studies have been carried out on open access highlighting its benefits like free access to information makes it more affordable, journals and articles become more visible, retrievable thus likely to be cited more than the non-OA journals.

NISCAIR has set up an open access platform for its journals to ensure widest possible reach, quick and easy access for Indian researchers and also around the world. In this study, impact of OA on NISCAIR journals in terms of visibility, citation counts and IF (impact factor) have been examined.

## Literature review

Citations show the popularity and recognition of an article and also that of a journal. A Thomson Reuters communiqué[6] remarked that "scientific literature citations are one of the greatest dividends of a

researcher's intellectual investment". Various studies show a relation between OA status and citation counts. Eysenbach[7] conducted a study on 1492 OA and non-OA articles published in *Proceedings of the National Academy of Sciences* (PNAS). He found that OA articles are recognised immediately and cited by peers than non-OA articles published in the same journal. Swan[8] and Wagner[9] reviewed various studies on open access citation advantages and reported that OA journals receive more citations as compared to toll access or subscribed journals. Evans and Reimer[10] also observed that there is an 8-20% increase in citations for articles that provide delayed (embargoed) open access (OA) (free online access).

Taylor &Francis[11], an international publisher conducted open access surveys in 2013 and 2014 and found that researchers have a positive attitude towards open access. The surveys also found that open access offers a wider circulation and higher visibility than publication in a subscription journal. Open access not only increases number of citations but also improves readership as well. Swan[12] mentioned a case study of Martin Skitmore and reported that his papers received more citations after the papers were deposited in the repository at Queensland University of Technology in 2004. Bjork and Solomon[13] in a study on open access versus subscription journals also observed that open access journals are equal in terms of scientific quality and receive same number of citations compared to subscription journals.

Gunasekaran and Arunachalam[14] showed that the impact factor of Indian open access journal is increasing. In 2011, 13 OA journals had IF greater than 1 as against 9 such OA journals in 2010. The number of Indian OA journals has also increased from 26 in 2004 to 47 in 2011 in Journal Citation Report.

Karunarathne[15] described impact of reducing embargo period and open access on *Journal of National Science Foundation of Sri Lanka*. After reducing embargo period from one year to six months, impact factor of the journal increased from 0.134 in 2011 to 0.232 in 2012. In June 2013, the journal was made open access. After ten weeks of OA, full text downloads increased from 36 to 1055 downloads in a day and foreign submissions also increased by seventy five percent.

Springer[16] reported that 202 of their 566 open access journal are listed by ISI and have an IF. Further, in 2014, 13 open access journals have received their first IF.

**Open access initiatives in India**

In India, the science academies and major journal publishing public funded institutions such as CSIR-NISCAIR have made their existing subscription journals also available as open access journals. Higher educational institutions are now creating institutional repositories and open access courseware.

According to Directory of Open Access Repository (OpenDOAR)[17], 61 premier R&D and higher educational institutions in India like Aryabhatta Research Institute of Observational Sciences (ARIES), Indian Academy of Science (IAS), Indian Institute of Science (IISc), laboratories under Council of Scientific & Industrial Research (CSIR), Indian Institute of Technology (IITs), Indian Institute of Management (IIMs), Indian Statistical Institute (ISI), Indira Gandhi National Open University (IGNOU) and many more have contributed to the creation of 68 open access repositories from India.

Directory of Open Access Journals (DOAJ)[18] lists 10,201 open access journals from 136 countries. Out of these 10,201 journals, 593 journals are from India. Registry of Indian Open Access Journals[19] lists 563 open access journals last updated on the website on 11.04.2013.

Council of Scientific and Industrial Research (CSIR) formed a "Group for Open Access to Science Publications (GOASP) of CSIR" in 2009 to frame a policy on open access for CSIR. On the recommendations of GOASP, CSIR issued a memorandum on 6th February 2009 giving the recommendations of GOASP of CSIR[20]. Later in 2011, CSIR prepared "CSIR Open Access Mandate". As per the mandate of OA for CSIR[21] "all research papers published from CSIR laboratories and supported by a grant from CSIR would be made open access by depositing the full text and the metadata (electronically archived data) of the paper in an institutional repository".

CSIR-Unit for Research and Development of Information Products (URDIP), Pune has set up a centralised institutional repository hosting service named CSIR Central for all the CSIR Laboratories[22].

CSIR-National Institute of Science Communication and Information Resources (NISCAIR) is the publishing arm of CSIR and is devoted to documentation and dissemination of S&T information. On the eve of "First International Open Access Day" on 14th October 2008, CSIR-NISCAIR launched two open access journals - *Indian Journal of*

*Chemistry –Section A* and *Indian Journal of Biochemistry & Biophysics* as reported by G. Mahesh.[23] Today, all the 18 CSIR-NISCAIR primary journals, 1 popular science magazine, and Natural Products and Resources Repository (NPARR) are accessible on the NISCAIR Online Periodicals Repository (NOPR) platform in OA mode. The purpose of the repository is wider dissemination of scholarly literature published in the CSIR-NISCAIR journals.

To increase the visibility of CSIR-NISCAIR OA journals, NOPR has been registered with international bodies like Registry of Open Access Repositories (ROAR), Directory of Open Access Repositories (OpenDOAR), Directory of Open Access Journals (DOAJ), Google Analytics, Google Scholar, etc. All the online journals have their unique e-International Standard Serial Number (e-ISSN).

The NOPR collection currently (as on 28.01.2015) holds about 25,180 full text articles from 18 research journals, 1869 articles from 3 popular science magazines and 368 articles from natural products resources. CSIR-NISCAIR has achieved 100% digitisation of all volumes of 5 journals namely *Annals of Library & Information Studies*, *Indian Journal of Biotechnology*, *Indian Journal of Natural Products and Resources*, *Indian Journal of Traditional Knowledge*, and *Journal of Intellectual Property Rights*. The full text of these journals is accessible from volume 1, issue 1 on NOPR.

Many of the CSIR-NISCAIR journals have a long legacy with the oldest journal going back to 1942. Eleven of its journals are indexed in Thomson Reuter's Web of Science. This study looks at the impact of OA on CSIR-NISCAIR journals.

## Objectives of the study

- To study the change in global visibility of the NISCAIR journals after open access;
- To compare the number of citations received both at journal as well as article level before and after open access; and
- To study the impact of increased access to journals with relation to their IF (impact factor).

## Methodology

Till the year 2007, the CSIR-NISCAIR journals were available only in print form. So, data for 10 years 2003-2012 were gathered from Thomson Reuter's Web of Science and the analysis was carried out for five year blocks i.e. 2003-2007 (print years) and 2008-2012 (OA years).

## Analysis

### Visibility of CSIR-NISCAIR journals through NOPR

According to Biennial Report 2008-2010 of CSIR-NISCAIR[24], as on 30 March 2010, NOPR has recorded 80,030 total visits on home page since 6 February 2009. Downloads of full-text articles [pdf files] was 15,19,302 for the period July 2009-March 2010 (data enabled from July 2009 onwards only). The current rate of download is more than 200,000 every month with 1,94,266 searches (more than 30,000 searches monthly).

According to Google Analytics statistics (6 March 2009–6 April2010) for the NOPR website as a whole:

a) Traffic sources shows 31,904 visits via 248 sources or mediums, from 121 countries and territories (India, USA, China, Turkey, UK, and Germany)
b) New visitors are 22,553 (70 %) and returning visitors are9349 (30%).

Statistics indicate that after open access, the journals became more visible and readers are accessing and using the journals worldwide.

## Citations impact

There is a link between open access journals, their visibility and number of citations received by the articles published in these journals. Table 1 provides the number of articles published in 12 CSIR-NISCAIR journals from 2003-2007 covered under WoS and the citations received by these journals before and after open access i.e., 2003-2007 and 2008-2012 respectively.

Table 1 indicates a significant increase in the number of citations received by these journals after open access. *Indian Journal of Experimental Biology* received 546 citations for 151 records in 10 years from 2003-2012. Out of 546 citations, only 13 citations were in 2003-2007 and 533 citations (97.16%) are for the articles published during 2008-2012 citations. *Indian Journal of Traditional Knowledge* received total 172 citations in 10 years. Out of 172 citations, only 1 citation was for the period 2003-2007 and 171 citations (99.41%) were for articles published during 2008-2010. During 2008-2010 citations increased to more than 60% to 90%. Fig. 1 shows the change in citation pattern before and after open access.

Table 2 shows the total number of records covered in WoS for the period 2003-2007and 2008-2012 and the citations received for 12 CSIR-NISCAIR journals.

Table 1—Citations received before and after open access

| Title | Total no. of Papers according toWoS 2003-2007 | Citations Received Before Open Access 2003-2007 | Citations Received After Open Access 2008-2012 | Total Citations |
|---|---|---|---|---|
| *Indian Jl of Biochemistry & Biophysics (IJBB)* | 297 | 229 | 802 | 1031 |
| *Indian Jl of Biotechnology (IJBT)** | | | | |
| *Indian Jl of Chemistry Sec A (IJC-A)* | 1063 | 1535 | 2335 | 3870 |
| *Indian Jl of Chemistry Sec B (IJC-B)* | 1268 | 1232 | 3255 | 4487 |
| *Indian Jl of Chemical Technology (IJCT)* | 542 | 311 | 824 | 1135 |
| *Indian Jl of Experimental Biology (IJEB)*** | 151 | 13 | 533 | 546 |
| *Indian Jl of Engineering & Materials Science (IJEMS)* | 365 | 189 | 467 | 656 |
| *Indian Jl of Fibre & Textile Research (IJFTR)* | 207 | 129 | 385 | 514 |
| *Indian Jl of Geo-Marine Sciences (IJMS)* | 235 | 108 | 494 | 602 |
| *Indian Jl of Pure & Applied Physics (IJPAP)* | 779 | 574 | 1399 | 1973 |
| *Indian Jl of Traditional Knowledge (IJTK)*** | 113 | 1 | 171 | 172 |
| *Jl of Scientific & Industrial Research (JSIR)* | 646 | 321 | 1408 | 1729 |

* IJBT covered in WoS from 2008 ** IJTK and IJEB covered in WoS from 2007

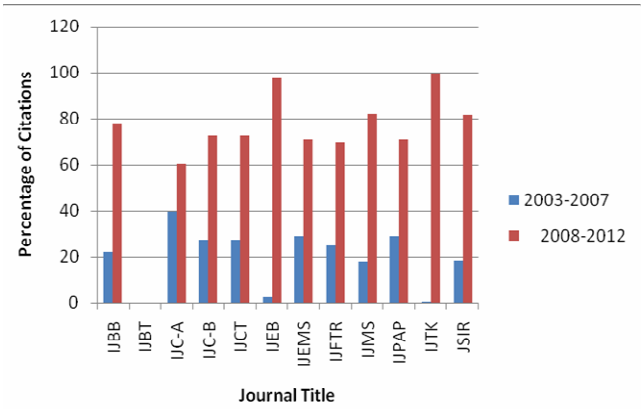


Fig. 1—Citation pattern before and after open access

The differences in the average number of citations received at journal as well as article level are noticeable in Figures 2 and 3. Increase in number of citations during the open access period shows the journals and the authors both are getting more attention and recognition from the research community.

*Impact factor of CSIR-NISCAIR journals*

Journal impact factor is an important criterion to judge the quality of scientific publications worldwide.

Table 2—Papers Vs citations

| Title | Total Papers in WoS 2003-2007 | Citations Received 2003-2007 Before Open Access | Total Papers in WOS 2008-2012 | Citations Received 2008-2012 After Open Access |
|---|---|---|---|---|
| IJBB | 297 | 229 | 304 | 584 |
| IJBT | Nil | | 362 | 334 |
| IJC-A | 1063 | 1535 | 551 | 1029 |
| IJC-B | 1268 | 1232 | 714 | 1035 |
| IJCT | 542 | 311 | 347 | 590 |
| IJEB | 151 | 13 | 669 | 1414 |
| IJEMS | 365 | 189 | 310 | 188 |
| IJFTR | 207 | 129 | 185 | 106 |
| IJMS | 235 | 108 | 386 | 250 |
| IJPAP | 779 | 574 | 693 | 871 |
| IJTK | 113 | 1 | 597 | 492 |
| JSIR | 646 | 321 | 703 | 921 |

In Journal Citation Report (JCR) 2011, 47 Indian OA journals are covered[14]. Out of 47, 11 (23.4%) journals are CSIR-NISCAIR journals. Till 2007, only 9 CSIR-NISCAIR journals were covered in JCR. During 2008-2013, the number increased to 12 journals. Impact factor (IF) of the journals has

also increased after the journals became OA from 2008 as shown in Fig. 4.

47 Indian OA journals covered in JCR-2011, 13 had an IF greater than 1.000[14]. Out of these 13 journals, 2 are CSIR-NISCAIR journals i.e., *Indian Journal of Biochemistry & Biophysics* and *Indian Journal of Experimental Biology*. Besides, *Indian Journal of Experimental Biology* appeared in WoS in 2007 and in a short span of time, the IF crossed 1. It is also noted that *Indian Journal of Biotechnology* got included in JCR in 2010 with an IF 0.385 and increased to 0.51 in 2013.*Indian Journal of Traditional Knowledge* was indexed in in JCR in 2009 for the first time with an IF 0.087 and its IF reached to 0.492 in three years in 2012. IF of *Indian Journal of Biochemistry and Biophysics* was 0.368 in 2007 and crossed 1 and reached 1.142, 1.026, 1.077 in year 2011, 2012, 2013 respectively.

*Indian Journal of Fibre and Textile Research* was covered in JCR before 2005 and JCR stopped covering this journal. IJFTR reappeared in JCR again in 2012 with an IF 0.486 and 0.778 in 2013.

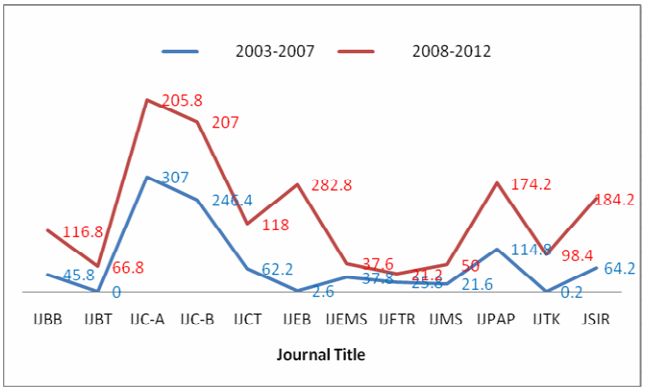


Fig. 2—Average number of citations for each journal a Year

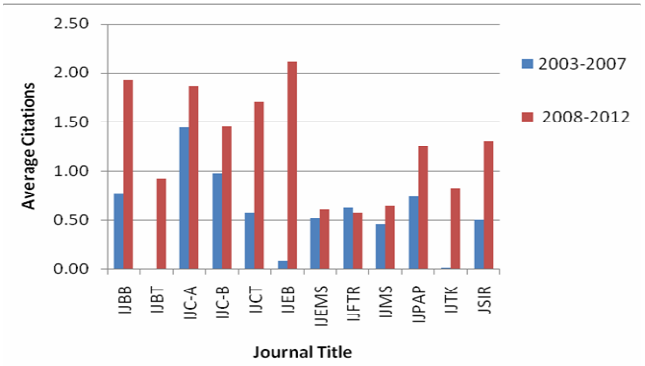


Fig. 3—Average number of citations an article a Year

## Conclusion

Results of the study show a link between open access and increase in visibility of the journals. Easy availability of the journals increases their use, citations and impact factor. Popularity of open access journals is increasing day-by-day. Major commercial publishers like Elsevier, Springer, Taylor & Francis, Wiley etc. have also launched OA journals and hybrid journals where author can publish his/her paper as open access by paying fee. OA journals in India and the world over are slowly gaining recognition. The Journal Citation Report (JCR) (Science edition) 2012 has indexed 99 Indian journals. Out of these 99 journals, 45 are open access journals and 54 are subscription journals[25]. Researchers and scientists are taking doing all efforts to ensure that their work reach

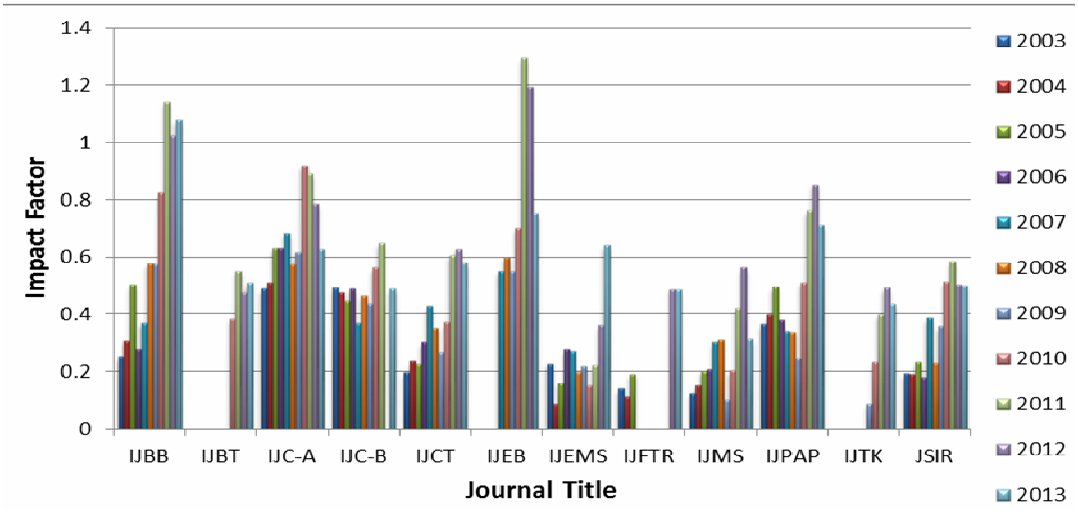


Fig. 4—Swing in IF of CSIR-NISCAIR journals

to large number of people.In near future, open access to information will help to reach the unreached.

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**References**

1 Budapest Open Access Initiative. Available at: http://www.budapestopenaccessinitiative.org/read (Accessed on 14 February 2014).

2 Singh S, What open access to sci-tech research can achieve. *Forbes India Magazine.* 14th May 2013. Available at http://forbesindia.com/article/breakpoint/what-open-access-to-scitech-research-can-achieve/35215/1 (Accessed on 10 January 2015)

3 White house announces new US open-access policy. Available at: http://blogs.nature.com/news/2013/02/us-white-house-announces-open-access-policy.html (Accessed on 15 January 2015)

4 RCUK Policy on open access and supporting guidance. Available at: http://www.rcuk.ac.uk/RCUK-prod/assets/documents/documents/RCUKOpenAccessPolicy.pdf (Accessed on 15 January 2015)

5 DBT and DST open access policy. Available at: http://dst.gov.in/whats_new/whats_new14/APPROVED%20OPEN%20ACCESS%20POLICY-DBT&DST(12.12.2014).pdf (Accessed on 29 January 2015)

6 Thomson Reuters predicts 2014 Nobel laureates, researchers forecast for Nobel recognition. Available at: http://thomsonreuters.com/press-releases/092014/2014-nobel-laureates-predictions (Accessed on 9 October 2014).

7 Eysenbach G, Citation advantage of open access. Available at: http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.0040157 (Accessed on 2 March 2015)

8 Swan A, The open access citation advantage: studies and results to date. Available at :http://eprints.soton.ac.uk/268516/ (Accessed on 2 March 2015)

9 Wagner A B, Open access citation advantage: an annotated bibliography. Available at :http://www.istl.org/10-winter/article2.html (Accessed on 2 March 2015)

10 Evans J A and Reimer J, Open access and global participation in science. *Science*, 20 February 2009.

11 Taylor & Francis open access survey 2014. Available at: www.tandf.co.uk/journals/explore/open-access-survey-june2014.pdf (Accessed on 2 March 2015)

12 Swan A, Open access impact: a briefing paper for researcher's universities and funders. Available at: http://www.openoasis.org/images/stories/file/Briefing%20papers/Open%20Access%20impact.pdf (Accessed on 29 January 2015)

13 Bjork B and Solomon D, Open access versus subscription journals: a comparison of scientific impact, *BMC Medicine*, 10 (7). Available at: http://www.biomedcentral.com/1741-7015/10/73 (Accessed on 13 October 2014).

14 Gunasekaran S and Arunachalam S, Impact factors of Indian open access journals rising, *Current Science*, 103 (7) (2012) 757-760.

15 Karunarathne U, Opening up to open access. Available at: http://www.inasp.info/uploads/filer_public/2013/11/08/opening_up_to_open_access.pdf (Accessed on 10 March 2015)

16 Open access at Springer- Impact Factor- facts & figures. https://www.springer.com/gp/authors-editors/journal-author/journal-author-helpdesk/before-you-start (Accessed on 18 March 2015)

17 Directory of open access repositories (OpenDOAR). Available at :http://www.opendoar.org/index.html (Accessed on 29 January 2015).

18 Directory of open access journals. Available at: www.doaj.org (Accessed on 29 January 2015).

19 Registry of Indian open access journals. Available at: http://www.oajse.com/rioaj_a-z_list.html (Accessed on 9 October 2014).

20 Arunachalam S and Muthu M, Open access to scholarly literature in India — a status report (with emphasis on scientific literature) Available at: http://cis-india.org/openness/publications/open-access-scholarly-literature.pdf (Accessed on 19 April 2015)

21 CSIR open access mandate. Available at: http://www.csircentral.net/mandate.pdf (Accessed on 9 October 2014).

22 CSIR central. Available at: http://www.csircentral.net/ (Accessed on 9 Oct 2014).

23 Mahesh G, Open access and impact factors, *Current Science*, 103 (6) (2012) 610.

24 NISCAIR Biennial Report, (2008-2010) 37-39. Available at: http://www.niscair.res.in/aboutus/about.asp?a=topframe.htm&b=leftcon.asp&c=Biennial-Report-08-10/biennial-report08-10.asp&d=test5 (Accessed on 29 Jan 2015).

25 Gunasekaran S and Arunachalam S, The impact factors of open access and subscription journals across fields, *Current Science*, 107 (3) (2014) 380-388.